SONY

White paper

October 2012

Xperia™ T

LT30a

Purpose of this document

Sony Mobile Communications product White papers are intended to give an overview of a product and provide details in relevant areas of technology.

Document history

Version		
November 2012	Second released version	Version 2
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Sony Mobile Developer World

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www.sonymobile.com/developer.

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Product overview

Xperia™ T – The ultimate HD experience

Your greatest moments, from life to phone to big screen, in beautifully vivid detail. Xperia T, powered by the latest Android software, brings you the ultimate HD experience. Xperia T has a Sony quality camera, the latest in connectivity, and a slim, ergonomic arc design. Sharing memories has never been more beautiful.

Save the moment with an HD phone

A first-class kick into goal. A golden sunset worth more than the plane ticket. Video chats so crisp the miles between you disappear. The 13 MP HD camera from Sony with full 1080p HD video recording captures it all in stunning detail. And since the most unforgettable moments are often unexpected, you'll be glad the fast capture camera goes from sleep to snap in just over a second.

Re-play it in vivid detail

Need an instant re-play to settle the score, or just feeling nostalgic? Flip through your personalised photo album - with the "Album" app you easily browse and share your photos and videos. Choose your most recent HD video or browse the globe to find the pictures you took in Spain. Who's that in the background? Zoom in super-fast to see. Re-live it all on the 4.6" touchscreen with Mobile BRAVIA® Engine. Your videos and pictures are crisp in every detail with no jagged edges or blurry faces.

The future of sharing

The perfect picture of your favourite couple, the track your friend was asking about. Forget messages and e-mail links. This NFC Android smartphone makes it easy to share content, phone to phone. Just hold your phone to your friend's, and watch sharing magic happen.

The best music - in Sony sound

The original is back. Xperia T comes with the new "WALKMAN" app. Fill it with your playlists. Or tap into one of ours and get album art and artist info in the process. Just like magic. See what your friends are listening to. Can't get enough? Go further into Music Unlimited and choose from millions of songs. When you've found the right track, crank it up with xLoud loudness enhancement, get it just right with graphic equalizers, and enjoy soul shaking clarity. Or connect to wireless speakers and use your phone as the ultimate DJ deck.

Share the magic on any screen

Home at last. Time to relax with the latest blockbuster? The "Movies" app magically downloads info on all the films that you have downloaded or side loaded, and lets you view them in high quality. Or why not play your videos on a big screen by connecting a standard HDMI cable to your HDTV using an MHL adapter* or a compatible Xperia TV Dock* accessory? With live streaming in full HD, what looks gorgeous on your phone also looks gorgeous on your HDTV. If you prefer to go wireless, you can use the Screen Mirroring** feature to share content from your phone via the TV***. With just the touch of a button, you can watch your selected photo pop up on the TV screen or listen to the current music track play on the TV's speakers.

** Separate accessory, not included.*

*** Your TV must support screen mirroring based on Wi-Fi CERTIFIED Miracast™ for the screen mirroring feature to work. If your TV does not support such screen mirroring, you need to purchase a wireless display adapter separately.*

**** When using screen mirroring, the image quality may sometimes be negatively impacted if there is interference from other Wi-Fi networks.*

Facts – dimensions, weight, performance and networks

Operating system	Google™ Android™ 4.0 (Ice Cream Sandwich)
Processor	1.5 GHz Qualcomm Krait MSM8960 Dual Core
GPU	Adreno 225
Size	129.4 x 67.3 x 9.35 mm
Weight	148 grams
Available colours	Black
SIM card	Micro SIM
Main screen	
Colours	16,777,216 colour TFT
Resolution	1280x720 pixels
Size (diagonal)	4.55 inches
Scratch-resistant	Shatter-proof sheet on scratch-resistant glass
Input mechanisms	
Text input	On-screen QWERTY keyboard
Touch screen	Capacitive
Touch gesture	Yes – multi-touch, up to 4 fingers supported
Memory	
RAM	1 GB
Flash memory	Up to 16 GB*
Expansion slot	microSD™, up to 32 GB
Camera	
Camera resolution	13 MP
Digital zoom	16x
Video recording	Yes – HD 1080p
Video chat camera	Yes – HD 720p
Sensors	
Accelerometer	Yes
Proximity sensor	Yes
Ambient light sensor	Yes
Magnetometer	Yes

Gyroscope	Yes
Networks	
LT30a	UMTS HSPA+ 850 (Band V), 1700 (Band IV), 1900 (Band II), 2100 (Band I) GSM EDGE 850, 900, 1800, 1900 LTE Band II, Band IV, Band V and Band XVII
Data transfer speeds	
GSM GPRS	Up to 70.4 kbps (download). Up to 35.2 kbps (upload).
GSM EDGE	Up to 236.8 kbps (download). Up to 118.4 kbps (upload).
UMTS HSPA cat 24(download)	Up to 42.2 Mbps
UMTS HSPA cat 6 (upload)	Up to 5.76 Mbps
LTE cat 3 (download)	Up to 102 Mbps
LTE cat 3 (upload)	Up to 51 Mbps
Hearing Aid Compatibility (HAC)	
M-Rating	M3
Teletypewriter (TTY)	Yes
Talk time (GSM)	Up to 7 hours**
Standby time (GSM)	Up to 450 hours**
Talk time (UMTS)	Up to 7 hours**
Standby time (UMTS)	Up to 410 hours**
Standby time (LTE)	Up to 220 hours**
Music listening time	Up to 16 hours**
Video playback time	Up to 5 hours**
Embedded Battery	1850 mAh (built-in), typical 1780 mAh, minimum

** Memory comprises approximate 2.5 GB of firmware, 2 GB of "Phone memory" for downloaded applications and 10.8 GB of "Internal storage" for music, pictures, movies and some application data. For a more detailed description of the different types of memory and how they are used, See "Memory in Android phones" on page 16.*

*** Values are according to GSM Association Battery Life Measurement Technique.*

NOTE: Battery performance may vary depending on network conditions and configurations, and phone usage.

NOTE*: All performance metrics are measured under laboratory conditions.*

Categorised feature list

Camera
13 megapixel camera
16x digital zoom
Auto focus
Face detection
Flash / Photo light
Flash / Photo flash
Front-facing camera (720p)
Geotagging
HD video recording (1080p)
Image stabiliser
Red-eye reduction
Self-timer
Scene recognition
Send to web
Sony Exmor R™ for mobile image sensor
Sweep Panorama
Touch capture
Touch focus
Video light
Video recording
Video stabiliser

Music
3D surround sound
Album art
Bluetooth™ stereo (A2DP)
Clear bass
Clear stereo
"WALKMAN" application
PlayNow™ service*
TrackID™ music recognition*
xLoud™ Experience

Internet
Google Play™
Bookmarks
Google™ search*
Google Voice™ Search*
Google Maps™ for Mobile with Street view and Latitude™*
NeoReader™ barcode scanner
Pan & zoom
Web browser (WebKit™)

Communication
Call list
Facebook™ application*
Xperia™ with Facebook
Google Talk™ application*
Noise suppression
Xperia™ Timescape™
Speakerphone
Twitter™ application*
Twitter™ (with Timescape™ integration)*

Messaging
Conversations
Email
Gmail™*
Instant Messaging
Multimedia messaging (MMS)
Predictive text input
Sound recorder
Text messaging (SMS)

Design
Auto rotation
Gesture input
On-screen QWERTY keyboard
Picture wallpaper
Reality Display with Mobile BRAVIA® Engine
Screenshot capturing
Touch screen
Live Wallpaper
Voice input

Entertainment

Accelerated Adobe Flash Video
Motion gaming
Radio (FM radio with RDS)
Sony Entertainment Networks*
Video streaming
YouTube™*

Organiser

Airplane mode
Alarm clock
Calculator
Calendar
Contacts
Document editors
Document readers
eCompass™
Infinite button
LiveWare™ manager
Notes
Setup guide
Stopwatch
Tasks
Timer

Connectivity

3.5 mm audio jack (CTIA)
aGPS*
Bluetooth™ wireless technology
DLNA Certified®
GLONASS*
MHL support
MediaGo™
Media Transfer Protocol support
Micro USB support
Native USB tethering
NFC
PC Companion
Synchronisation via SyncML™
Synchronisation with computer
Synchronisation via Microsoft® Exchange ActiveSync®
USB High speed 2.0 support
USB mass storage
USB support
Wi-Fi®
Wi-Fi® Hotspot functionality

** This service is not available in all markets.*

Technologies in detail

NOTE: The information outlined below is general and levels of compliance to standards and specifications may vary between products and markets. For more information, contact Sony Developer World or your Sony contact person where applicable.

Device-to-device communications (local)

Bluetooth™ wireless technology

Bluetooth™ profiles supported	Advanced Audio Distribution Profile v1.2 Audio/Video Remote Control Profile v1.0 Handsfree Profile v1.5 Headset Profile v1.1 Object Push Profile v1.1 Phonebook Access Profile v1.0 Human Interface Device Host Personal Area Networking Profile (Network access point, PAN User)
Core version and supported core features	3.1
Connectable devices	Products supporting at least one of the profiles above.

More information:

www.sonymobile.com/developer

www.bluetooth.com

Wi-Fi®

Supported standards	IEEE 802.11a/b/g/n and Wi-Fi®
Connectable devices	Wi-Fi® access points
Frequency band	2.4 GHz / 5 GHz
Data transfer rate	Up to 150 Mbit/s
Security	WEP 64 bit WEP 128 bit Wi-Fi Direct TKIP CCMP (AES) Open Authentication Shared Authentication EAP-SIM EAP-TLS EAP-TTLS/MSCHAPv2 PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC WPA Personal and WPA2 Personal WPA Enterprise and WPA2 Enterprise
Encryption	WEP, TKIP and AES
Power save	WMM-UAPSD QoS, WMM

DLNA Certified® (Digital Living Network Alliance)

Supported Device Classes	**M-DMS – Mobile Digital Media Server** Media Types: images, video and music Summary: The digital media server exposes the media files in your phone to a Wi-Fi® network. The files can then be accessed from other DLNA Certified® clients. **+PU+** Media Types: image and music Summary: Play media in the phone on another device, such as a TV or computer using 2-box push technology. +PU+ is integrated into the Gallery and Music applications. **M-DMP – Mobile Digital Media Player** Media Types: image, video and music Summary: Play content stored on another device, for example, a server or a PC, directly on the phone. **+DN+** Media Types: image, video and music Summary: Download content stored on another device, for example, a server or a PC, and play the downloaded content directly on the phone.
Supported Bearers	Wi-Fi®
DRM Support	The DLNA Certified® implementation does not support DRM-protected content.

Messaging

MMS (Multimedia Messaging Service)

According to OMA Multimedia Messaging Service v1.0 + SMIL

Email

Bearer type (IP)	GPRS, EGPRS, UMTS
Character sets	BIG5 Traditional Chinese GB18030 ISO-2022-JP Japanese ISO-8859-1 ISO-8859-2 Eastern Europe ISO-8859-5 Cyrillic ISO-8859-7 Greek ISO-8859-9 Turkish ISO 8859-11 KOI8-R Cyrillic Shift_JIS Japanese USASCII UTF-16 UTF-8 Windows® 874 Windows® 1251 Cyrillic Windows® 1252 Windows® 1254 Turkish Windows® 1258 Vietnamese
Protocols	POP3 and IMAP4
Push email	Microsoft® Exchange ActiveSync® (EAS)
Secure email	SSL/TLS, both port methods (POPS/IMAPS) and START-TLS
HTML mail	Yes (read only)

More information:

www.sonymobile.com/developer

www.openmobilealliance.org

Positioning – location based services

Supported standards:

- OMA Secure User Plane Location (SUPL)
- 3GPP™ Control Plane location (including Emergency location)
- Qualcomm® GPSOneXtra™

Supported satellite systems:

- GPS
- GLONASS*

* **NOTE***:* GPS and GLONASS are used together to calculate the position. Positioning is more robust and accurate in most conditions, if both systems are active. The benefits of using GLONASS are automatically available for all applications using the Satellite Positioning API ("GPS Provider" in Android terminology).

Provisioning (OMA CP)

OMA CP version 1.1

Multimedia (audio, image and video)

Audio Playback	**Decoder format**	**Supported in file format**
	Audio decoding MPEG-1/2/2.5, audio layer 3	MP3 (.mp3), 3GPP (.3gp), MP4 (.mp4, .m4a)
	AAC, AAC+, eAAC+	3GPP (.3gp), MP4 (.mp4)
	AMR-NB, AMR-WB	3GPP (.3gp)
	General MIDI (GM)	SMF (.mid)
	Linear PCM 16bit	WAV (.wav)
	OTA	OTA (.ota)
	Ogg vorbis	Ogg vorbis (.ogg)
Audio Recording	**Encoder format**	**Supported in file format**
	AMR-NB, AMR-WB	3GPP (.3gp), MP4 (.mp4), AMR (.amr)
	AMR-NB, AMR-WB, AAC-LC stereo Sample rate: 48 kHz Bit rate: 128 kbps	3GPP (.3gp), MP4 (.mp4)
Image Playback	**Decoder format**	**Supported in file format**
	1, 4, 8, 16, 24 and 32 bpp and RLE encoded formats	BMP (.bmp)
	Single and multi-frame, bitmap mask support (GIF87a format and GIF89a format)	GIF (.gif)
	Joint Photographic Experts Group	JPEG (.jpg)
	Portable Network Graphics Bitmap mask support	PNG (.png)
	Wireless Bitmap	WBMP (.wbmp)
Image Capture	**Encoder format**	**Supported in file format**
	Joint Photographic Experts Group	JPEG (.jpg)
Video Playback	**Decoder format**	**Supported in file format**
	MPEG-4 Simple Profile Level 6, Advanced Simple Profile Level 5	3GPP (.3gp), MP4 (.mp4), Matroska (.mkv), AVI (.avi, .xvid), (.mov)
	H.264 High Profile Level 3.2	3GPP (.3gp), MP4 (.mp4), Matroska (.mkv)
	H.263 Profile 0 Level 70	3GPP (.3gp)

Video Recording	Encoder format	Supported in file format
	Video H.263 Profile 0, H.264 Baseline Profile Audio: AAC-LC stereo Sample rate: 48 kHz Bit rate: 128 kbps AMR-NB	3GPP (.3gp), MP4 (.mp4)
Audio/Video Streaming	Streaming transport	RTSP according to 3GPP™ HTTP streaming
DRM	DRM (Digital Rights Management) – features the rights and copy protection of downloaded content	OMA DRM 1.0 Marlin DRM

Synchronisation (OMA DS, EAS, Google Sync™)

OMA Data Synchronisation protocol versions 1.1.2 and 1.2

OMA Data Formats: vCard 2.1, vCalendar 1.0

Microsoft® Exchange ActiveSync® protocol version 2.5

Microsoft® Exchange ActiveSync® protocol version 12

Microsoft® Exchange ActiveSync® protocol version 12.1

Microsoft® Exchange ActiveSync® protocol version 14

Microsoft® Exchange ActiveSync® protocol version 14.1

Google Sync™

Related information:

www.sonymobile.com/developer

Web browser

Browser version	Android 4.0 Browser (Based on WebKit™)
Browser Application	Full page PC rendering Landscape/portrait rendering Pan & Zoom Off-line reading Desktop Mode Internet Search Bookmark Sync Sharing links using NFC
Browser compliancy	CSS 2.0 CSS 2.1 CSS 3.0 DOM 2.0 DOM 3.0 HTML version. 4.0 HTML version. 5.0 JavaScript 1.7/ECMA-script 262 3rd edition WebGL 1.0 XHTML Basic version 1.0 XHTML 1.1 SVG 1.1
Supported Device API	Geo-location API Device Orientation API File Reader API Touch Events API (including multi-touch)
Protocol compliancy	Gzip HTTP/1.1 OMA Download 1.0 TLS 1.0 and SSL 3.0

Related information:

www.sonymobile.com/developer

In addition, the Chrome browser is pre-installed. More information about the Chrome browser can be found at Google Play *https://play.google.com/.*

Memory in Android phones

To use Android phones efficiently, users should be aware of the different types of phone memory. This knowledge is important in order to understand, for example, where music, photos and videos are saved; how many apps can be downloaded from Android Market; and how photos can be copied to a PC.

Generally, all Android phones share the same basic memory setup. What differs is how much memory is available to you via the different types of memory, and whether your phone uses an external SD card or an internal memory chip. Any information specific to the particular phone model described in this White Paper is noted as such.

Please note that when internal memory is used, the figures you see in the phone information menus may appear to not match with the total amount of stated physical memory. In other words, the figures might not seem to add up. The reason for this is that some sections of the memory may use two memory cells instead of one for every storage unit, in order to secure storage integrity. The need for such “double storage” depends on the type of memory chips used and may therefore differ between products.

Types of memory

The types of memory described below are consistent with the terminology used in Sony mobile phone menus and in other content relating to 2012 Xperia™ phones:

1. **Dynamic Memory** (also known as RAM, or non-persistent memory, because everything in RAM disappears when the power is turned off) is used as “working memory” when the device is actually running, and is shared between the operating system and all active applications and services. Therefore, the amount of Dynamic Memory influences how many applications and operating system services can run at the same time. In Android™ phones, the operating system automatically closes applications and services that are not being used. However, such automatic functionality has limits. For example, if a lower amount of RAM is assigned to a certain release of the operating system, phone speed will be impacted.

   If you experience problems with RAM, for example, if the phone runs slower than usual or if the Home application restarts frequently when you leave an application, you should minimize the use of apps that run all the time. Such apps could include, for example, applications that frequently download social service updates. You could also consider using a static wallpaper instead of a live wallpaper.

   To see which apps and services are currently active, go to **Settings > Applications > Running Services**. You should have at least 50 MB, and ideally 100 MB or more, of free RAM to avoid slowdowns and application restarts.

   You should also be aware that if you update the phone to a later Android release, the load on the built-in Dynamic Memory will increase due to the addition of more features. As a result, the phone may run slower after an update.

All the memory types described below (in sections 2 to 5) together comprise “persistent” memory. What this means is that all data and content stored on these sections of memory will “persist” after the power is turned off (in contrast to the non-persistent RAM). Persistent memory can therefore be used for storing applications, images, music and any other content which can only disappear after being explicitly deleted.

2. **System Memory** (also known as “System partition” or “/system”) is used for the Android OS and for most applications that are pre-loaded from the factory. This type of memory is normally locked, and can only be changed through a firmware upgrade. There is usually some free space available in this section of memory. However, since it is locked, you cannot save apps, photos or any other content to this memory. System Memory is reserved for future firmware upgrades, which almost always need more memory than the original firmware. You cannot see or influence the use of this memory.

3. **Phone Memory** (also known as “Data partition” or “/data”) is memory type that is used as working memory. It can be compared to the C: drive on a PC or to the startup disk on a Mac. All applications downloaded from Google Play™ or other sources are installed (at least initially) to this type of memory. Some can later be moved to another memory.

   In this type of memory, as with System Memory, all applications have an allocated area which no other applications can access and to where the applications can and usually do save their data (such as phonebook, calendar, notes, and email applications).

   Phone Memory will tend to fill up as a result of normal use, the use of applications saving their data, and you downloading and installing new applications. Therefore, the larger this memory is from the start, the more applications you can download and use.

   If the Phone Memory starts to get full, the phone slows down, and in some cases it might no longer be possible to install more apps. You should always ensure that you have at least 50 MB of free Phone Memory. If not, you should consider removing some apps that you seldom use, or move some applications from the Phone Memory.

   You can see how much Phone Memory is free under **Settings > Storage > Phone memory**. You can also view Phone Memory availability and usage information under **Settings > Applications > Manage Applications**.

4. **Internal Storage/SD card** (also known as “/sdcard”) is the memory used for:

   - Content such as photos, movies and music which is added, for example, as a result of the user taking photos with the camera, downloading media files, and performing file transfers.
   - Certain applications to store data in cases where larger amounts of content are involved. For example, applications for games and maps need to store larger files which would not fit in the Phone Memory.
   - Applications that can be moved after installation from the Phone Memory. Note that not all applications can be moved, and in such cases the option to move the particular application will not be available. Typically, apps running as services, apps with widgets, or apps for live wallpapers cannot be moved. Also note that when apps are moved to the Internal Storage or to the SD card memory, a small part of the app will still remain in the Phone Memory.

   This type of memory differs most between different Android phone models. In some models, a large amount of internal memory is built into the phone and is referred to in the user interface as “SD card” memory. In other cases, the phone features a memory card slot and a removable memory card that is bundled with the phone. No Android phone can be shipped without this memory type whether it comes as built-in storage or in the form of a removable memory card. The advantage of having an external memory card slot is that a user can replace the memory card with a larger one later on. In contrast, built-in internal memory cannot be extended. The drawback for the manufacturer is that a removable card is more expensive. Therefore, at a certain price level, a manufacturer can offer a larger amount of memory if it is built in, everything else being equal.

   You can see how much Internal Storage is available under **Settings > Storage > Phone memory**.

   In the Xperia™ T, the three areas of persistent memory (System Memory, Phone Memory, and Internal Storage), together with some small memory allocations for system operations, share 16 GB of built-in eMMC memory.

   Note that in some products you may find both a large internal memory and a memory card reader slot. However, on the current Android platform, the card reader slot does not work in the same manner in a phone with large internal memory, for example, a phone with only a memory card slot. Generally, while you can access content (such as videos, photos and music) on this optional memory card, you cannot

in general save anything to the card. Some applications, for example, a backup service application, may still be allowed to do so. In effect, this means that some products feature a fourth type of persistent memory, called “External Card”:

5. **External Card** (also known as “/ext-card”) is the name for the removable SD memory card in products where there is also Internal Memory and where this Internal Memory is referred to in the phone’s user interface as the “sdcard” memory. This External Card memory can generally not be written to from the phone, but it can be used (by the user) to store content from other sources. For example, you can write to this memory from a PC when the phone is connected to a PC and when the External Card is mounted. Some applications on the phone may in some cases, however, also have permissions to write to the External Card.

Backing up data to different memory types

Generally, you should not save photos, videos and other personal content solely on the internal memory of a phone. If something should happen with the hardware, or if the phone is lost or stolen, the data stored on the phone’s internal memory is gone forever.

In a phone where an SD card reader is the main memory, it is relatively easy to take the card out and copy all content to a PC or Mac, or to an entertainment device with a memory card slot. In a product featuring Internal Storage as the main memory, it is not possible to physically remove the memory. Instead, any critical or high-value content must either be transferred over a network (mobile or Wi-Fi) or via a cable. To facilitate the transfer of data via a cable, the Xperia™ T supports the Microsoft standard, Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your phone and a PC. For Apple Mac computers, a special application is available with built-in support for MTP. This application can be downloaded from the Xperia™ T Support page. Note that you do not need to back up or make a copy of applications that you downloaded from Android Market/Google Play™. They can normally be downloaded again if you have set up a Google account to work in your phone. You can find the apps which you have purchased under “My apps” in Android Market/ Google Play™, so you will not need to either pay for or search for them again.

Trademarks and acknowledgements

Visit *www.sonymobile.com* for more information.